

**NASA-JPL-AUDIO-CORE**

**Moderator: Jeff Nee**

**July 10, 2018**

Jeff Nee: Well hello everyone. This is Jeff Nee of the Museum Alliance. I'd like to welcome you to this telecon today. Thanks to all of you for joining us and to anyone listening to the recording in the future.

Today we're talking about preparing for the Apollo 50th anniversaries. The slides for today's presentation can be found on the Museum Alliance and NASA Nationwide sites. As always if you have any issues or questions now or in the future you can email me at [JNee@jpl.nasa.gov](mailto:JNee@jpl.nasa.gov). There are several speakers today so each set of slides should be properly labeled with the presenter's name. I know it might get confusing, but the presenters will do their best to keep us on track and which slide number they're on and all that good stuff.

You'll be able to read the full bios of our speakers on the websites, but as a brief introduction our first speaker today is Dr. Noah Petro who is the Project Scientist for the Lunar Reconnaissance Orbiter Mission. Noah, it's all yours.  
[Petro slide deck]

Noah Petro: So yes, I've recently taken on the wonderful responsibility of being the basically the lead of NASA's ongoing sort of like Star Trek. It went from a five-year mission to an ongoing mission. It's now an ongoing mission to be studying the Moon and its environment. So it's a wonderful opportunity. Actually as much as we're all so excited about the ongoing 60th anniversary of NASA right now and the imminent 50th anniversary celebrations for Apollo, next year will also mark the 10th anniversary of LRO's launch and arrival at the Moon. So there's much cause for us to celebrate our past successes but also keep an eye towards the future.

And so I'm going to talk a bit today about Apollo at 50, why Apollo was important and kind of at least try to hit home the point that when Apollo 11 splashed down on July 24, 1969 or when Apollo 17 returned to the Earth in mid-December of 1972, that that wasn't, I mean, as much as the Apollo lunar program ended, our interest in the Moon and our study of the Moon has evolved and kept going since then.

So, I want to make sure that the celebration of the 50th anniversary does not just look back 50 years at isolated, very important events but also puts them in the context of what we've done since then and that lunar science is ongoing. And so what I'll attempt to do today at least talk a little bit about why Apollo was important, what did we learn, and what are we continuing to learn.

And then obviously to talk about what we've learned about the Moon from Apollo would be multiple hour long presentations so I can't capture all of that in one talk. But we'll hopefully at least give the beginning nuggets of information. And as is always said on these Museum Alliance talks, I'm more than happy to continue the conversation after the presentation. My email address is just my name [Noah.E.Petro@nasa.gov](mailto:Noah.E.Petro@nasa.gov). And always happy to particularly talk about the Moon in any way, but obviously very happy to talk about Apollo and our ongoing exploration of the Moon with LRO.

Just as a bit of context about myself, I am an Apollo aficionado not just because of what it meant, but because of a very personal connection to Apollo. Fifty years ago, Apollo 11, well, 50 years ago they're getting ready to go to the Moon and in the years leading up to that helping get Apollo almost literally off the ground at least was my dad. He was an engineer working on building parts for the lunar module and for the astronaut's backpacks that they carried around when they were walking on the lunar surface.

And so for me, Apollo is not just something that happened that's a really kind of important and exciting historical event, but it's also a very important personal connection that I have through my dad. So, I think a lot of people have similar stories. There was hundreds of thousands of people involved with the Apollo program and so I know that there are people who have a personal connection to Apollo across the country and around the world.

So if you got my slide set, you hopefully have my first slide up. And I heard the conversation earlier on. And yes, the Apollo 50th anniversary logo is a real beautiful way to celebrate again, not just what we've done 50 years ago but looking forward to and of course going on to Mars is one of the inevitable and eventual goals of NASA.

[Slide 2] All right, so slide two. This is just a little bit of shameless self-promotion because it's one of my favorite pictures that we've taken from the Moon from LRO by LRO. This is a view of the Earth as it sets over the eastern rim of the Moon taken by our camera. And of course, it evokes all of the memories of the similar Earth rise picture that was taken by Apollo 8.

I guess I should mention that as much as what I'll talk about today focuses on the anniversary of the Apollo landing, NASA is going to begin celebrating the anniversary of Apollo in October commemorating the anniversary of the Apollo 7 mission and the in December with Apollo 8 as well.

So while I focus on the Moon landing missions, we also should pay attention to the precursor missions to Apollo that really paved the way for us to be able to get to the surface.

[Slide 3] So the next slide, I just like to when talking about Apollo kind of give a little bit of context about why Apollo happened and what led up to Apollo. And so everyone I think is familiar with Sputnik, the small spacecraft ushered in the dawn of the space age. That launched by the Soviet Union on October 1, 1957.

[Slide 4] And I think what's remarkable and I always have to remind myself is that it was really only 12 years later or 4,306 days later there was a mission launched to land humans on the Moon. So we went from having basically no experience in space, just under 12 years later to sending humans to the Moon.

And when I've given talks about Apollo, I've always asked for the kids who are under 12 years old to raise their hands and those are kids who would've been born on October 1st who wouldn't have even been around by the time that we sent humans to the Moon. So in very short order, we began to venture deeper into space and eventually get to the surface of the Moon.

[Slide 5] But that October 1st, if we go to slide five I lay out kind of a timeline for at least NASA's interest in getting to the Moon. And I do this because again it's important not only to understand that Apollo 11 was important but it took a lot of work to get to that point.

Starting in March of 1955, NASA or the precursor to NASA exhibited interest in having launch heavy loads into space. So as much as President Kennedy in 1960-61 gets credit for sort of kicking off Apollo, the work to get to Apollo had started by that point.

Nineteen fifty-eight of course now looking 60 years back, NASA is born but even before that there was the first efforts to start doing scientific mapping of the Moon, which was an effort that the Air Force led. And so even then there

was a recognition that the Moon was going to be of interest and that there would be people who were going to want to know more about the Moon.

Moving on shortly after -- just a few years, a year after or two years after Sputnik -- we started or the Soviet Union started sending missions to the Moon. So obviously it became an immediate target.

[Slide 6] If you go to slide six, this is where things obviously start happening very quickly. Even before President Kennedy was inaugurated, the name of Apollo was already kicked around. NASA was considering what would be the next big thing or what would be the big thing that they should do. And sending humans to the Moon was early on identified as an important topic, an important goal.

Of course everything changed on April 12, 1961 when Yuri Gagarin was sent in Earth orbit. And the US responded by as the US government still does to this day what do we do to catch up and change and how do we respond to this.

And so you can see in the span of essentially under a month, just a few weeks, the president gets excited about the idea of doing something to catch up and beat the Russians. And the idea of sending humans to the Moon becomes sort of that objective that we recognized was something that we could potentially do within a decade.

May 5th, Alan Shephard becomes the first American astronaut into space and 20 days later the famous speech to Congress that JFK gave basically setting the goal of landing humans on the Moon and returning them safely to the Earth. And basically in that short order we went from no experience in space to setting an incredible goal of getting humans to the Moon and back.

And you'll notice that very rarely in that initial discussion was anything about science. There was the goal was to get humans to the Moon and back. Kennedy said nothing about getting humans and rocks back. And so the science that came out of Apollo was really added because it was recognized it was too good of an opportunity to not get rocks and samples back and not to set up experiments but to at least early on in Apollo, that was secondary to the objective of getting humans to and from the Moon.

[Slide 7] So if we go to slide seven, this jumps forward not to look at the sum total of Apollo and acts as a reminder that the six successful landed missions to the Moon were all on the near side of the Moon. The left hemisphere is the side that faces the Earth and the right hemisphere is the far side of the Moon.

This is a view constructed using images from LRO. And of course I always like to remind folks that as much as we've been to the Moon six times with humans, we have really just scratched the surface of exploring the Moon. And there's a vast amount of lunar real estate left for us to explore.

I'm hopeful that with this recent initiative to get back to the Moon that we can have maybe it won't be called Apollo but essentially Apollo 18, 19, 20 and so on scattered around the far side of the Moon -- that the next time that humans visit the Moon we'll explore the far side as well.

[Slide 8] The next slide, slide eight, is just a sort of a numeric or statistical way to summarize what Apollo did. The figure at the right is a compilation of kind of the statistics of the Apollo lunar missions -- how far they walked, how much material was brought to the surface, how much time do they spend outside of the surface, how many pounds or kilograms of rocks were brought back.

And that's also to highlight kind of how Apollo 11 really is an outlier compared to all of the other missions. They traversed the smallest amount of distance. They brought the fewest smallest weight of experiments to the surface. They spent the least amount of time outside the lunar module -- only one EVA -- and they also brought the fewest kilograms, the fewest weight or mass of rocks back to the Earth.

But of course, that was not the objective -- to bring lots of rocks back and set of lots of experiments. Early versions of the Apollo 11 mission had only one astronaut going outside of the lunar module. It would have only been Neil getting out of the lunar module, picking up a few rocks, setting up the flag, and coming back inside. It was really envisioned early on in the development of Apollo 11 to be just basically a test flight to the surface.

It took hard work by several other astronauts, including Jack Schmitt who eventually walked on the Moon on Apollo 17, to convince NASA to bring any experiments to the surface. And that they could set up those experiments in short order.

As you see on the timeline, they were only outside for just over two hours while they traversed on the lunar surface. Of course, they were also able to convince them that both astronauts should get out, that sending Buzz to the Moon and not letting him get out and walk would just have been too cruel. But really, Apollo 11 was an engineering test and a test of just the fact that they could actually get to the surface of the Moon.

Apollo 11 did carry some experiments to the surface. They were able to carry a seismometer, a lunar retroreflector, and a solar wind collection foil basically -- very simple experiments to set up, short lived. They didn't have the nuclear

power source that subsequent experiments that were sent to the Moon had. But they were able to set up some material there.

And now as the missions on Apollo progressed and evolved, more mass was sent to the surface, more experiments were sent to the surface. And I'd like to highlight one experiment that was sent to the surface of the Moon that reflects not just the development of instrumentation but also of the capabilities of the people who were going to the surface of the Moon.

[Slide 9] And so if you go to slide nine, it shows I think one of the great accomplishments of Apollo that demonstrated that it didn't just take test pilots to fly into space and it didn't just take test pilots to walk on the Moon.

We're actually able to send scientists to the Moon and eventually on Apollo 17 Jack Schmitt was able to go. Of course, it took some political wrangling and pressure for the folks in the astronaut office to recognize that a scientist could go. But smarter heads prevailed and so Jack was allowed to go.

And I think it reflects one of the greatest experiments of Apollo that is not necessarily recorded in the scientific literature was sending humans to the Moon. And not just in the form of trained scientists but also even the test pilots, being able to send people who could describe their experiences, talk about it.

We just lost Alan Bean a few weeks ago who obviously turned to a career in painting. And so he was able to express his experience through paintings. And I think those sort of experiences of sending people to other worlds, highlights the importance of human exploration. Not only are they able to do complicated tasks in short order but also come back and inspire all of us to do great things as well.



And so, obviously the human story of Apollo is important, that they come back and they told stories. But the story of Apollo is both a human one and scientific one.

A little earlier on I talked about the Apollo 11 mission and what they were able to do. And so one of the things that I always try to convey to people when I talk about Apollo is the scale of what they were able to do. I'm not sure that I have a good sense of what it meant for them to walk on the Moon in terms of what they were physically able to do.

[Slide 10] It's sort of hard to take these incredible events in history and explain them to people. And so what I've done is in a series of visuals working with a colleague of mine at Goddard, Brent Garry, is basically take the footprint of their explorations. So if we go to slide ten, what we've done in this figure is take the Apollo 11 mission and the traverse of Apollo 11 and put it on top of in this case the deck of the USS Intrepid, basically trying to put on a scale familiar to people what they did.

I'd be curious what people would say if you asked them how far did the Apollo 11 astronauts walk. Would people say they walked five feet or would they say they walked two miles? And of course the reality is closer to the five feet. They basically did not leave the area, either of the middeck of the USS Intrepid or in a scale that I like to put it at, they didn't leave the infield of a baseball diamond essentially. It's a very good way to illustrate what they did in very short order.

I know that I was asked for the digital file of this. And I'll get the we have KMZ files or KML files for each of these and we can share those with everyone so you can plot these kind of maps on your particular museum or

your location to again help convey the sense of scale for what they did. And of course on Apollo 11, I think most people are surprised at really how closely they stayed, how short of a distance they walked in the just over two hours that they were on the surface of the Moon.

There is that one little jaunt to the right there, to the east. That was the famous traverse that Neil took, Neil Armstrong took on his own to a small crater that he recognized as we was landing that he said well this would be an interesting place to go walk to. And so he took a short walk without actually telling anyone on the ground that he was doing it. They only realized when they developed his images later on that he had gone over there. He knew he wanted to do it but didn't want to ask permission.

[Slide 11] Of course by the time we get to Apollo 17 on slide 11, they're traversing in a rover and covering much greater distances. And so again by this point they're able to cover a good portion in this example of Manhattan into the East River. Of course, the Apollo astronauts were not prepared to cross rivers, but we can pretend in this case.

And so just in the short order of almost four years, they're able to go from exploring very little portions of lunar ground to now driving great distances.

[Slide 12] I talked about the science return from Apollo and there were the experiments that were left behind which were of course very valuable and important. But the real highlight of Apollo was in the samples that were brought back. And I know that Apollo 11th anniversary on July 20th next year will be sort of the keynote day for the event.

But July 24th should also be regarded as an important day because that's the day that the crew completed the journey really fulfilling the President's goal

of sending humans to the Moon and returning them to the Earth. But also the bringing back of the samples and getting the samples back to the Earth was a major scientific accomplishment because for the first time, we had samples from the surface of another planet. We knew where they came from. We had geologic context for those samples. And so we could start studying kind of the history of the Moon, the history of the solar system in earnest.

It's also important to remember that in the 1960s there was a second major revolution in our understanding of geology. And that was the developing idea of plate tectonics on the Earth. And so the 1960s saw these two major revolutions in our geologic understanding of planets. One in the form of plate tectonics on the Earth and then by application of whether or not plate tectonics existed elsewhere in the solar system. And the birth if you will of planetary science by way of the return of samples from the Moon.

The Apollo samples enabled this new era of sample analysis. It led to the development of new techniques, new instrumentation to analyze these samples in laboratories all across the Earth. The phrase Moon shot has been used a lot to convey exciting new eras of exploration or of scientific endeavor.

And so applying it back to the original Moon shot really kicked into high gear our study of geologic samples -- not just from the Moon, but from the Earth -- meteorites and helped developed the field of geology into a much more modern science.

With the samples of course we were then able to understand the age of the Moon, composition of the Moon, what were the properties of the surface. But it's also very important to know that they came from a known location. They weren't just randomly picked up. They were in the form of meteorites. We knew where they were on the Moon. And by collecting them from a known

location, you could then begin to say well, if we know this location is this, we can then apply that understanding elsewhere across the lunar surface.

And so just knowing that the volcanic rocks that were returned by Apollo 11 were 3.9 billion years old, for instance. Okay. Well that begins to tell you something about the age of the Moon. And the Moon must be older than that. I showed earlier that they did not traverse a great distance during Apollo 11 but the soil samples, the regolith that they brought back, had small fragments from far and wide across the lunar surface.

And so even with those very early lunar samples, we were able to get a taste of the geologic diversity of the Moon and really understand what the entire Moon was going to look like. And then of course with the subsequent five missions, we were able to collect more samples, answer questions, raise more questions, but all of that hinged on what we began to learn with Apollo 11.

Keeping in mind of course that Apollo 12 went to the Moon just later in November of 1969 so there was not a great deal of time to study the Apollo 11 samples. Really just to understand what was operationally done, what worked, what didn't work on the Moon with Apollo 11, apply that to Apollo 12 and go forward from there.

[Slide 13] is just looking at the idea that now almost 50 years later we have a spacecraft orbiting the Moon in the form of LRO. And as much as the LRO science team spends a lot of time trying to come up with new questions, many of the questions that were raised by Apollo are still valid today -- understanding the ages of features on the Moon, understanding how the Moon came to be, whether through lunar formation theories or even just how the Moon evolved early in its history. We're still trying to tackle that. But all of

the understanding of kind of the framework for those questions is derived from the samples that we returned.

I like to think of Apollo - I do a lot of puzzles with my kids. And they always try to get them to start by finding the four edge pieces and we try to keep our puzzles simple. We don't do circular puzzles or anything. Find the edge pieces, the corner pieces, and build in from there.

Really what Apollo did was give us those edge pieces. It gave us parts of the rest of the frame of the puzzle. And since then we've been filling it in. What is the puzzle? Just understanding how planets work, how planets operate, how the solar system came to be.

And so with the return of those samples in July of 1969, we were able to really for the first time with firm understanding begin to fill in those puzzle pieces. We've come a long way in the 50 years since Apollo with modern analytical techniques. One of the great examples of why that's important is in the identification of water in lunar samples.

Fifty years ago understanding how much water was on the Moon was a very important thing. And the initial results suggested there was no water on the Moon. And so for almost 40 years, we believed that there was no water on the Moon.

And now in the last ten years, we've had a great second revolution in our understanding that there is water on the Moon. There's water in the Moon. And that the samples, while they appeared to be dry at first actually did contain small amounts of water that we just weren't about to measure with the measurement techniques that we had 50 years ago.

[Slide 14] And so on slide 14, my sort of conclusion slide there is using cribbing a line from Apollo 17 where they were saying it was the beginning not the end, which of course everyone at the time thought was ridiculous because it was the end of Apollo. But it really was also the beginning of a new era of science, of planetary science, of lunar science. But it's not by any means that we're done. We still have a lot to learn about the Moon from the Apollo missions, from the missions that are at the Moon right now in the form of LRO. And we have a lot of work left to do to prepare for future missions to the Moon and then beyond.

I've been called an Apollo fanatic. I've been called many things, that I pray to the god Apollo. And I think that's one of the best compliments I can get because the work that we're doing is in the shadow of Apollo, the legacy of Apollo still remains with us today as we study the Moon.

And it's not just about understanding the Moon. It's also about understanding the Moon's place in the solar system as well. I like to use the analogy that when we flew by Pluto, we knew that surfaces on Pluto were young because they had no craters because we had been to the Moon. And that it's our understanding of the Moon that trickles through every planet, every object in solar system. When we look at it, some part of our understanding goes through what we learned because we went to the Moon six times 50 years ago.

And so with that I think I'll go to our next speaker.

Jeff Nee: Andrea, please take it away. [Switch to Jones slide deck next]

Andrea Jones: Thanks, Jeff and thank you Noah. I really enjoyed your talk and I really loved the puzzle analogy. That was really beautiful. So I hope that gets a lot of use out there. And I also really appreciated you setting up this context because I

think that the Apollo anniversary and all of the associated anniversaries are really an opportunity to celebrate the past, the present, and the future.

And so I mean you just only touched on that. As you said you could, I mean we could talk about this for days and days and days. But really putting all that together so we're not just looking back, and I know that several people and I know including Carla who will be talking as well were just thinking how do we make sure that this is forward looking and also raising awareness of the science that's going on right now that people might not be aware of. So, thank you.

And I just wanted to kick off an example of a way that you might consider getting ready for the Apollo anniversary and also sustaining momentum afterwards. And that is through International Observe the Moon Night. And I will talk about that.

But I also just want to mention that this is one chance, and I hope that after we're done we can also be thinking of lots of different ideas for celebrating this.

So with that for me International Observe the Moon Night I hope many of you have heard of it -- maybe even are involved in it already. But for those of you who are not familiar, I wanted to give you a brief background.

[Slide 2] So on slide two of my set, International Observe the Moon Night is you know, a worldwide celebration of lunar and planetary science. It's a day that we invite everyone on Earth to go outside and look up and enjoy the Moon, learn about the Moon, celebrate the Moon and how it's related to ourselves. Each of us has a personal connection to the Moon.

I love to kick off workshops with asking people what they're favorite memory that features the Moon is. And I've never yet had someone who couldn't respond to me with...my kids point it out when it's following us home in the car or I got to go for this moonlit walk on the beach or something else that's special to you. So everyone's connected. It's integrated I our art, in our culture, in our language.

And we really encourage people to celebrate that as well as to use it as an opportunity to find out what's been happening with lunar science recently. And this is a chance to share that with the public.

It actually started in 2010 which is when, well LRO launched in 2009. We had a big celebration at NASA Ames and at NASA Goddard for letting people know that we were in orbit around the Moon and it was very exciting. And people were so interested and so eager for more that we actually turned it into a National Observe the Moon Night but never really had one because right away we had international participants. So it became International Observe the Moon Night right afterwards. And LRO -- the Lunar Reconnaissance Orbiter -- does lead this effort, but we do it with many partners.

[Slide 3] So on slide three, for those of you who don't know this yet we use International Observe the Moon Night as a chance to connect our scientists at NASA but also amateur astronomers, also scientists at universities or science centers or other places around the country to connect experts with the public, with students, with others interested in learning more. And also a place we can provide NASA content through the portal of International Observe the Moon Night.

And so it's a chance to again connect about the Moon of course, but then I really like to use it as a chance to talk about how the Moon connects with



everything. So you tell me what you're learning about, what you're interested in talking about, and I am sure that we can find a way that the Moon is involved somehow.

So at our events at Goddard for example, we always have an invitation to our Earth science folks, our helio folks, our astro folks. Everybody is welcome because we can all talk about some connection to the Moon. And then we do the same at their events as well.

And it's also a chance we like to engage especially through social media different space enthusiasts around the world to one another on social media, and I'll get to that as well. But really again we're hoping to just inspire people, get people excited and wanting to learn more and hoping to provide opportunities to do that.

[Slide 4] On slide four, I just wanted to show folks an example, a map of where we've had events. Since 2010 we've had almost 100 countries. Hopefully this year we'll get up there. All 50 states and DC and Puerto Rico have hosted events.

And we actually are aware that people are hosting events in other places around the world but do not have internet access. So for example, Africa has had a lot of events that we've heard about but there are places that don't have very good internet connections and so they haven't registered. But we are engaging with many people around the world and we hope that you would get involved in this as well and then share it with observers in different places, too.

[Slide 5] So on slide five I just wanted to show you some examples of different places we've had some event and let you know that the way we talk

about International Observe the Moon Night with events is pretty loose. So what we encourage people to do is to get out and look at and learn about the Moon and celebrate it in whatever way and in whatever context, with whatever resources you have available and in a way that would be interesting to your audience.

So this is a whole spectrum of different places. So we have had events at science centers and museums, which is a great place to do it. But we also have had people set up their telescopes on the sidewalk outside of an ice cream shop or we've had bars who have had blue moon specials.

We actually had one host say that there were getting married on International Observe the Moon Night -- which I don't like the name International Observe the Moon Night because the Moon is out during the day, too. But anyway, they had a wedding that day and they had all their guests go out and look at the Moon. So it can really be anyone anywhere. You can have a private event or a public event. And if it's a private event, we won't actually let people know the address of where you're hosting it so that people won't show up. And I'll get into the website in a minute.

But there are different ways that you can do it and we have resources available. But then we really encourage you to take it and make it your own and really have it resonate with you and your interests and the interests of your audience as well.

[Slide 6] On slide six, just some key evaluation findings. So we heavily evaluate this event with external evaluators from the Planetary Science Institute. And I think one of the reasons it's so popular is we really do want everyone to do it their own way. So you can do that in a number of different ways. People are actually learning about the planets and the Moon and other

stars because they have amateur astronomers at events and we encourage them to show you all kinds of things in the sky, not just the Moon.

Especially I guess brighter objects as the Moon is always a first quarter Moon when we're hosting this, because we like to have the terminator where the shadows are best for observing instead of a full Moon where it's actually not quite as good for lunar observing even though we encourage you at any time to go out and look at the Moon and enjoy it whenever you can see it.

And then we actually have data that indicates that people are motivated to learn more about space science and exploration after attending an event. So that's great. And that's really in thanks to all of you out there who are already hosting these events. So, wonderful.

[Slide 7] On slide seven, these are just some comments that describe how people are really interested in learning about a lot of different things up in the sky. It's taking astronomy to the people. And I really enjoy comments such as all the motorcycle riding firefighters we coming. So things like that really show the spectrum of different types of events that are out there.

[Slide 8] On slide eight, it's just an indication of a lot of our partners. And these are our main partners but we actually work with a whole lot of different groups for International Observe the Moon Night. And you can see here we have SSERVI is very supportive of this -- the Solar System Exploration Research Virtual Institute -- our Discovery program, lots of different museum partners and science centers as well. Science Festival Alliance has a lot of this. So it's great fun.

[Slide 9] On slide nine, I wanted to encourage all of you to pay attention to the lunar science that we have on our social media websites. We are active on

Twitter and Facebook all the time but closer up to International Observe the Moon Night we will have lots of Flickr and Tumblr and Instagram posts. Some of that will be through lunar channels. Some of that will be through the NASA flagship channel and NASA Goddard and others. But we'll be using the hashtag observe the Moon across all platforms.

And we encourage you to use that as well. If you're hosting an event or if people at your institution are involved in International Observe the Moon Night, you can share your experiences, let people know that you're part of this. And using that hashtag will connect everybody together. So it's kind of a nice way to see what else is going on. You can say this is what the Moon looks like from where I'm standing right now. And see at other times and actually monitor as it's going around the world, which is kind of fun.

And then we have graphics and promotional materials and lots of other content available on the International Observe the Moon Night website. And that is an example up here of a graphic from last year. And we'll post these and you can take them and change them around. We'll post just the content and everything editable. So if there's something that you want to like feature instead, that would be something we really encourage you to do.

[Slide 10] So on slide ten, just an example from NASA's Goddard Space Flight Center in Greenbelt, Maryland, we host an event each year here and it's really a chance again for the scientists here at Goddard to interact with our community and we have all kinds of people that come out -- some people come year after year after year, which is really exciting. And then there's the new people who have never ever looked at the Moon through the telescope or who have never even looked through a telescope before, which is really remarkable. I'm sure many of you know how wonderful and thrilling that is to

be able to share that opportunity with someone. So there's lots of different ways that you can get involved.

[Slide 11] And then on slide 11, I wanted to again make that connection. We have been riding the eclipse wave still. I'm sure many of you are still on that wave as well, just the amount of interest and excitement and enthusiasm for space science resulting from the total solar eclipse or whatever portion of the solar eclipse you were able to see. We still have a lot of interest at Goddard, anyway and through the people that we work with still trying to learn more about space science.

And so we're trying to take advantage of that and channel that interest towards lots of different places, but International Observe the Moon Night is certainly one of those places. And as we're gearing up for the Apollo Moon landing anniversary and celebrating all the associated anniversaries, this is a place where you can provide your community with a chance to learn about what's been going on, what's happening now, and the directives that we've been given about going back to the Moon. This is a place and an opportunity to discuss that with your community.

[Slide 12] So on slide 12 -- the last one I've got -- it's just one of our products for this year. This is the front of our save the date card on top and then the bottom is just our partners, which is normally on the back of the card. But this is an example of some graphics we have available. More information's on the back.

And on the bottom right there, [moon.nasa.gov/observe](https://moon.nasa.gov/observe) is our new home for International Observe the Moon Night in terms of web content. And we just made the switch a few weeks ago and we're still populating the website with new content. So that's really exciting for us. When you go to [moon.nasa.gov](https://moon.nasa.gov)

you will now get all kinds of information from NASA about the Moon and it'll also point you to Observe the Moon Night as well.

And on there, a new switch we're also making this year is instead of just trying to find out where events are, we're also looking just for lunar observers. So if you are looking at the Moon on October 20th and you don't want to say hey I'm having an event but you want to let NASA know, let observers around the world know that you're involved, you can say I'm looking at the Moon from here and then you can be a part of that global effort as well. It's not just for events although we certainly encourage those as well.

So with that, I can wrap up here. And I wanted to make room for Carla to get within this hour in case people had to take off early. So I'm happy to answer questions but I really encourage you to think about a number of ways to celebrate the anniversary and hope you will consider International Observe the Moon Night as one of those ways that you can get involved.

Jeff Nee: Great. Thanks, Andrea. IOMN is always a great mainstay for our group and we hope that all of our new members will take up the call in their own neighborhoods, too. Great. So Beth and Barry are from the Office of Communications at NASA Headquarters. Bill, go ahead and take it away.

[Now switch to Dicky presentation slides]

Bill Barry: [Slide 2] Okay. Thanks everybody. But I'll start on slide two with our communications strategy. We are faced with back to back anniversaries here for NASA. And they run right up against each other, as you'll see here shortly. So the 60th anniversary on October 1st and then we go right into Apollo 50th season.

So with limited resources, our effort has been to try and sync up as much of the material as we can and unify the things that try and get the effort as useful as possible. And we're attempting to collaborate, leverage, and integrate a lot of different things that are happening on there.

[Slide 3] So if you go onto slide three, you can kind of see that we're focusing on the 60th anniversary through the October timeframe here. And we've been doing some stuff about the 60th anniversary so far but in terms of online content and social media stuff that we'll be doing, things will ramp up a bit at the end of this month on the anniversary of the signing of the enacting legislation of the Space Act. So that happens on July 29th and then there will be a bunch of new content and materials will come out over the next 60 odd days or so. It's about 60 days there between the signing of the Act and the actual anniversary of when we opened for business on October 1st.

So we celebrate the birthday of NASA on October 1st. A lot of people note the fact that NASA was created effectively by the legislation on July 29th but we actually celebrate our birthday on the first of October. And we're attempting to sync up as much as possible across the country at NASA centers activity related to the anniversary on the last weekend of September. And then we'll have events here at NASA Headquarters and across the nation for employees and others on October the first.

But, it will depend on where you're located around the country what the local NASA center may or may not be doing.

Then we immediately rotate from that at the beginning of October into all 50th events. And we'll expect to be celebrating Apollo 50th events for a number of years until December 2022, which will be the 50th anniversary of the Apollo 17 mission.

Missions that we're particularly noting in the next year are of course Apollo 7, the first mission launched on October 11th, Apollo 8 which was of course the first mission around the Moon, and Apollo 11. Not that we're going to ignore 9 and 10. They were important missions. But things that you'll see most of the activity for will mainly be Apollo 8 and 11 with some other ones in the middle.

[Slide 4] Scrolling down to the fourth slide there, you can see more about the 60th anniversary, which updates we already talked about.

[Slide 5] For the Apollo 50th key updates on slide five, you can see kind of what I talked about already which is the Apollo 7 Apollo 8 events.

The coin unveiling has to do with the US Congress passed a law directing the Mint to release a 50th anniversary of Apollo coin set. And the legislation specified what one side of the coin was going to look like and also specified that the other side of the coin would be determined through a public contest to take submissions from the public about it, what the other side of the coin should look like.

That contest was run in the last year. The selection's been made and they're going to unveil the design of both sides on the coin on the anniversary of the Apollo 7 mission. And that event will be at the Air and Space Museum here in Washington.

We're talking with the Smithsonian also about partnering with them on an Apollo 8 anniversary. We'll also have some other Apollo 8 content that will happen throughout December of this year.



The design of that coin that I just talked about is coming out in October but the actual release of the coin for sale will come in January of 2019 at Kennedy Space Center, Florida. And then there are a number of other events in the spring of 2019 in the like I said the big sort of push for Apollo 50th anniversary things we expect that most public attention will follow on Apollo 11 week as we're calling it. And there are a bunch of events going on, including a NASA broadcast on July 19th and a grand opening of the refurbished Mission Operations Control or Mission Control in Houston on July 20th.

[Slide 6] Now, if you scroll down to slide number six, you'll see that that's our 60th anniversary web page events page. And if you've got an event going on that you don't see on that web page and you would like to see it on the web page, let us know about it and we'll be happy to put it on there. We're trying to collect there on that page any events that might be of interest to the public that mark the 60th anniversary. We'll have a similar one for the Apollo 50th page when the Apollo 50th page goes live.

[Slide 7] One of the things that we've been having a really interesting collaboration with is the National Park Service. If you scroll to slide seven, the National Trail System is celebrating their 50th anniversary. And their mascot for that is the dog, the Newfoundland dog that Lewis and Clark brought along with them on their trek across the northwestern part of what's now the United States.

And so they have this Newfie News blog and they sent us some stuffed beanie-baby sized copies of this dog. Seaman was his name. And they're calling him Seaman, Junior. And we've had our centers create blog posts about that. You can see the first one on that page there. Because Seaman, Junior is a pup, the small beanie baby sized dog is now in the International

Space Station. They launched him on the Dragon supply mission on July 9th. And so there will be blog posts from space from the dog and there will also be posts about his training here on Earth that are going to come to NASA centers.

And we think that's kind of a fun thing that people enjoy. We have certainly had a lot of fun and our colleagues out at the centers have had a lot of fun creating interesting pictures and blog posts. There's some zero G training. There's Seaman in high altitude flights at our Armstrong Flight Research Center. There's going to be some really interesting blog posts here so keep your eyes on that one as the summer goes along.

[Slide8] If you roll down to slide number eight, the NASA 60th anniversary this just gives you a summary of kind of our main talking points about the 60th anniversary. And we're tagging that NASA over the last 60 years. Has provided discovery, leadership, and opportunity for our nation and we are continuing to build on that great background as we move ahead into the next 60 years.

[Slide 9] And for those of you who are into the social media thing, if you want to use a hashtag that matches up with what the hashtag we're using is, that's on slide number nine. For the 60th anniversary it's # NASA60th. For various reasons, we don't use that version on print products but we are using that on social media to identify 60th anniversary posts.

[Slide 10] And if you want to get in touch with me or Beth or other folks on the anniversary team -- at the moment that's me and Beth but we expect that the team will be growing here shortly -- you can do that by going to the address on slide number ten, the Headquarters anniversary address.

So like for example if you have an event that you don't see on our anniversary page and you want to have us add it to that, send a note to that address. Beth and I have individual addresses both those are flooded with lots of other stuff and we check the anniversary inbox first. So if you want to get our attention, the best way to do it is to send it to that anniversary address rather than to our individual inboxes because you're more likely to get noticed first on that anniversary email box.

[Slide 11-15] The rest of the slides -- there are about four of them there -- that show you if you're internal to NASA how to find our materials. If you want materials from that page, like the logo, the Apollo 50th logo or the NASA 60th logo, those are downloadable from our downloads page and the email address that's in there or the website address that's in there. But if you have a problem with that, just drop us a note at the anniversaries page. We'll be happy to help you out.

And with that, I will wrap up and leave it to questions for later.

Jeff Nee: Thanks, Beth and Bill. Okay, so that's all for now for the NASA side of things. We're going to treat this as a little panel so feel free to direct your questions to one or all of the speakers. Noah, Andrea, Beth, and Bill can feel free to comment and add their perspectives at any time about anything they want.

But until we get somebody, I'll start with Andrea. Andrea, I notice you have a gap in Iceland. We have a Museum Alliance member in Iceland. I'll have to...

Andrea Jones: We were just actually out in Iceland doing a lot of volcano research. So that's excellent. We've got to boost that up. And actually we're going back so I'm going to see if we can get some partners out there.

Jeff Nee: Yes, it's the Exploration Museum in I can't pronounce the name but it's in Iceland. It's the only one we have in Iceland, so.

Andrea Jones: Well, we've got to get them involved. And also just thanks, Jeff. I wanted to mention to folks that we are meeting at Goddard and Beth and Bill just for your information too we're going to be talking about how we're going to support the anniversary broadly. And we have of course the entire LRO science team and then many other SSERVI teams and others that we are working with. And a lot of scientists are very eager to support this event.

And so museums out there if you're interested, I'm sure you're going through Headquarters as well which is a wonderful way to do it but we're also eager to help support different events, too. So if there is interest, I can help make connections as well to different lunar scientists as well as different lunar educators.

Nicole Zellner: I have a question. Hi, this is Nicole Zellner. I'm a lunar scientist but I'm also very active in public outreach. And we have hosted International Observe the Moon Night at college. And I also give a lot of talks.

My question is what are the efforts on your part in all of your duties to include the contributions of the women and underrepresented minorities who have also and had contributed to the success of Apollo 11? In particular of course the *Hidden Figures* who have gotten so much notoriety as well as *Rocket Girls* or the protagonists in the book, *We Could Not Fail*.

I'm really interested in having some handouts or some slides that I could incorporate into my public outreach activities that reflect the contributions of these people as well.

Bill Barry: Well, Bill Barry here from NASA Headquarters. I'll take a stab at answering that. On all those things, we have considerable amount of material already out there on Hidden Figures and on all kinds of minority representation and things. So, those are certainly ready to use already and they're already available out there. So I'd encourage you to take a look at that material to focus on that stuff.

And, part of the purpose of having a coordinated effort here and having some sort of prearranged stuff is that we want to make sure that people are not just looking back at this as a historical event. We're also pivoting to the future here and talking about where we're going in the future. And part of that is the workforce. And we want to make sure that we're being as inclusive as possible on everything that we do.

So that is in fact something that we're constantly attentive to. Do I have a handout that I can send you that talks about what Katherine Johnson did for Apollo 11? Not at the moment, no but that's certainly in the realm of stuff that we're thinking about doing and something that like I said, I think you could probably pull some of that stuff together from the material we already have available on Modern Figures. If you go to [nasa.gov/modernfigures](https://nasa.gov/modernfigures) that's the repository for stuff on the Hidden Figures.

And I'd be happy to talk with you about other stuff, too. So feel free to drop a note to our anniversary's address if you have a particular suggestion for something you'd like to see.

Jeff Nee: Yes, and - go ahead, Noah.

Noah Petro: This is Noah. So Nicole I don't know if you've seen or anyone has seen those great set of advertisements that Highlighter has put out. But one of them I mean, it's a magnificent set of ads for the Highlighter company. But one in particular is showing the flying room for Apollo 11 and in the way background is the scientist from MIT whose name escapes me right now in the background and she's highlighted.

It's a series of ads about women's contribution to various moments in history. But that one in particular is pretty breathtaking and it's a wonderful tribute to her accomplishments. I'll find it and send it to you. But I know it's been making the rounds on Twitter for instance recently. Not that I would say I would include that in any official presentations, but it's a good acknowledge at least of the contributions made during Apollo 11.

Woman: I have a question.

Jeff Nee: Sure. Go ahead.

Woman: Is there anything that you can point us to that would show the technologies that we take for granted perhaps today that have their genesis in the early Moon missions?

Bill Barry: Well, Bill Barry here again. I'll take a stab at that, too. There have been - maybe we should just a web page link to this if we can do that at some point as a follow-up. But there's a whole industry here at NASA Headquarters of folks who basically look at spinoffs from the space program. And there have been any number of web pages and other things about specifically spinoffs from the Apollo program. But there are lots of them you can point to.

Janice Hill: This is Janice, so hi, this is Janice Hill, I'm a Solar System Ambassador. And one thing that I really love is Apollo 8 and the connection to the environmental movement. That was one thing that was stressed, something that I read from NASA which talked about how 14 months later you had the first Earth Day after we got to see the Earthrise.

Sean Beavers: I have a question for Dr. Petro if he's got a second. My name is Sean Beavers, I'm a Solar System Ambassador in the North Texas area, and I've got numerous questions but I boiled it down to one sort of general question to ask you, sir. And what I'm curious about, as we all know the Chinese space program has been particularly vigorous in the last few years. And they do have plans to land their astronauts on the Moon soon.

So what I'm wondering is, I know that scientific communication usually triumphs when political communication does not, so I'm curious to find out if the Chinese space agency and our space agency NASA has cooperated with each other in any way towards this end, and if so, how.

Dr. Petro: Okay, yes, that's a tricky question but I will answer it as best I can with what I know right now. Because of various political pressures, direct communication from NASA to the Chinese government has been impossible. Well, it has been difficult, basically. Certainly there are no bilateral discussions between China and the US, and if anyone knows differently please correct me.

But there are collaborations between university professors here and in China, and so that's one way where the communication has worked very well. Obviously one of the hallmarks of NASA missions is that all of our data from

missions, for instance all of the data from LRO, is made publicly available to be used by anyone around the world. And we know for a fact that our colleagues in China have used our datasets.

That's a wonderful resource that's available for their use, and so for instance for their robotic landers they have so far one lander and they have a far side lander that they have in the works, will use our data.

Now what's being planned and prepared for Chinese astronaut landings, I certainly am not aware of what discussions are going on, but I would be surprised if anyone is planning a return to the Moon, to the lunar surface and is not using our data.

I know China has sent their own orbiters and generated their own image archives, but we have by far the best images of the lunar surface that any spacecraft has taken in the last 50 years or so. So I know that data that we've constructed and collected is being used probably every day by scientists all around the world including in China, and I'd be surprised if that wasn't being fed into their plans for getting back to the lunar surface. Not sure if that answers all of your questions if not let me know.

Sean Beavers: Well, it mostly does, but I'm just of the opinion, I think most of us are, that our next planned missions to the Moon are going to be conducted more or less as a jumping off point for the Mars mission. So I'm just curious in the current political climate, how you know the United States, China, European Space Agency and others are going to be able to communicate effectively to make this happen, because it's going to have to be an international effort. No one agency's going to pull this off.



Bill Barry: Bill Barry here again, on the China thing in particular there is a law that prohibits NASA from cooperating with China. Congress has decided that we shouldn't be doing that without their approval. So every contact we have with the Chinese is closely monitored by Congress and has to be reported from here. We're not going to go out and do something like that until the law changes or something else happens on that front.

On your statement that there has to be an international event, I will remind you that during the Apollo program, in fact the United States went to the Moon by ourselves. So it's not impossible, it's just a matter of how much money you want to spend. So, and I think most countries agree that it's a good idea that we should collaborate, that's kind of the direction that NASA's headed on that front.

And there are some international coordination groups that are already meeting, that are discussing these sorts of issues and collaborating to make plans. There's something called the International Space Exploration Coordinating Group, ISECG, and NASA folks are meeting with those folks on a regular basis and discussing plans.

Jeff Nee: Okay, so now, in the last 20 minutes, again we want to be flexible today. But we wanted to facilitate conversations between members toward this anniversary celebration. So first up I wanted to introduce Carla Bitter, who is leading the Destination Moon programming at the Museum of Flight in Seattle. Carla, did you manage to get on?

Carla Bitter: I'm here.

Jeff Nee: Oka, good, okay so Carla has a slide deck too. If you can pull it up, now Carla can go ahead and take it away.

Carla Bitter: Well, hi friends, and I'll try to be super quick so that we can have more of a conversation. But I'm just thrilled to be the project manager for a big initiative here called Destination Moon, which is the Smithsonian and NASA traveling exhibit that contains all the Apollo 11 mission artifacts. So the command module and Buzz's helmet and gloves and a hatch door and some Moon rocks.

And it's just got some beautiful, beautiful unique artifacts that are an incredible complement to our own Apollo gallery and F1 engines and some really cool stuff that we have here. And we are absolutely honored to be hosting Destination Moon starting in April, running through Labor Day next year and we'll have it for the 50th anniversary.

So our organization decided this is one of the best community engagement opportunities we're ever going to have. These beautiful artifacts, this amazing one of a kind anniversary, so we thought let's really cast the net wide and engage new partners. So thanks so much everybody for giving me a couple minutes to talk about it and ways to get involved if you're on the West Coast.

The exhibit is currently at the St. Louis Science Center and they're actually having a 49th anniversary party this month, and it'll be followed, traveling to the Heinz Center of History in Pittsburgh, which will have it for Apollo 8. And I know they're planning a beautiful sort of multi-generational and non-denominational examination of what Apollo 8 kind of gave us as a worldview for ourselves. And Museum of Flight would be very excited to do something like that, as well.

So really cool stuff, and if you're in any of those parts of the country and have a chance to check it out or get involved, I encourage you to do so.

[Slide 2] Second side is a quick, if you haven't been to the Museum of Flight, it's a really large. Someone actually described our space and acreage on the radio the other day and I never really thought about museums coming in at acreage, but it's a big place. And our mission is to be the foremost educational air and space museum in the world, and we have about 600,000 visitors annually. We are expecting record-breaking attendance with this exhibit next year and just so honored to be hosting it.

[Slide 3] The next slide, slide three of six, talks a little bit about what we do and how we do it. And then moving to Destination Moon, which is four of six, this is that Apollo 11 mission exhibit. It's intended to come across as a blockbuster, these are the last artifacts on Earth from Apollo 11 and it's that bit of nostalgia, that bit of history, and that amazing opportunity to look forward to what we're going to do next in the space program.

[Slide 4] Skipping quickly, that's the command module there on slide four, which is just a spectacular thing to see in person, and imagine coming back from the Moon into the ocean in that thing. It's pretty amazing to take a peek at it.. So we're going to do a bunch of stuff, really starting with a series of VIP openings in April, if you're in town we would love for you to join us. We're going to have monthly programmatic elements including a lot of stuff that Andrea's talking about, really trying to engage some of the LRO team. But then helping to tell our local story as well about the past, present and future of the space program here in Seattle.

[Slide 5] We'll do a quick flip to that last slide, which is if you are in this area, we're looking hard at our regional, national and even international PR and publicity, so engaging people to come to the museum around this anniversary that maybe don't see themselves as attending an aerospace museum or spending time doing this.

We're also going to do something new for us, which is language-specific materials, because we get a lot of tourists here, especially in summer, and a huge Asian market of tourists. So translating these materials into Mandarin and Cantonese as well as Spanish for the first time for this exhibit and certainly for ourselves.

As Bill and Beth mentioned some really cool specials. NASA and PBS going on that big July 19, 20 and 21 weekend among other things. And we're going to hold a three-day flagship event which may or may not be called Apollopalloza, and I've heard other places doing eight-day events, eight days in space and as many people that we can bring in to share the joy, the accomplishment and just the amazing energy of having this human endeavor in the rear-view mirror and what's coming up fast on the horizon is really our goal.

And we would just love to work with any science and cultural institutional partners on community engagement events. We're also working with the city of Seattle for something called the Seattle Summer of Space, really trying to engage everybody in this region in the understanding of what we have had to offer. The lunar rover was built here in Kent, we actually have the engineering model and I love, love, love Noah's slide of showing it traverse over Manhattan in equivalent space. I just knew that immediately, that was just such a great presentation, thank you for that.

And our current situation here, where we do have Jeff Bezos' space company, Blue Origin, and a lot of local space enthusiasts as well as smaller companies, Sherpa companies, people sending up cubesats, we've got a pretty big space environment going now as well as looking into the future.

So my contact information's there at the end, and I'm serving as a project manager for this one, which is just trying to integrate all the pieces, all the parties and everybody that we can garner here or support you in any way with information for these really special anniversaries. So thanks so much for having me and letting me chat about this project a little bit.

Jeff Nee: Great, thanks Carla and the first thing that comes off the top of my head is just once you get all those translations done, we'd love to have some in the Museum Alliance or share them out, however.

Carla Bitter: Oh, yes.

Jeff Nee: Definitely, because a lot of people you know are really getting into the whole multi-lingual education space.

Carla Bitter: Absolutely. Yeah, we're thinking it's going to be an exhibit guide into three or four languages. So, but everything helps.

Jeff Nee: Yeah, absolutely, I totally agree. Yeah. And I guess just moving really quickly on to the next person who e-mailed me, in case you're wondering how they got on this list they just e-mailed me and told me they wanted to say something. So Carolyn Holmberg, are you on?

Carolyn Holmberg: Hi, I am on, hopefully unmuted.

Jeff Nee: Yeah, no, you didn't have any slides, right Carol?

Carolyn Holmberg: I have no slides. Yeah, we're a much smaller museum, Museum of York County in Rock Hill, South Carolina, and we are looking for a planetarium show. I am mostly planetarium, we have very little exhibit space, I'm the

planetarium manager. We're looking at First and Farthest, which has like six minutes of Apollo. And We Choose Space, but if anybody is making or knowing of another planetarium show, particularly one that's cheap, that would be awesome. Not cheap, less expensive.

We have gotten, we're a Smithsonian affiliate and although we don't have the big exhibit, I notice that for Smithsonian affiliates you can get onto the Air and Space Museum archives and request material. We do have a spinoff, someone mentioned the spinoff, there's a spinoff that's made here that was used in Apollo 11, and we're hoping to get it.

It is a piece of PBI rope, PBI is fire retardant. It was contracted by NASA after the Apollo 1 fire, and was used on Apollo 11. Apparently just to stow sleeping bags, they were wrapped on this rope on their way back they put them in their sleeping bags and they just lashed them with this rope.

So it's been to the Moon and it's got local significance, so we're doing that. The other thing that I was thinking of doing was a memory book, and I'm just looking for more ways to make that successful. I thought about having people over 50 write their memories, but then I thought people will just kind of misuse that and Batman will be writing memories.

So I thought about maybe getting e-mailed memories and we're also thinking about taking an iPad and videotaping local community people with their memories. Something like Story Corps, although Story Corps is probably a lot harder than it looks, and that's really all I wanted to say and if anybody has any suggestions for me I would love to hear them.

Rosanne Saxon: Hi, this is Rosanne Saxon, can I come in on this? I'm an SSA, and I've been addressing this for a number of months, almost a year now. I look at this a

little differently, I would like to say that we take this to the school, to the principle, at the top or the superintendent, to put it into all the schools so that it hits every discipline within a school of all ages.

So if it's a third grader, they can interview their grandparents. They can be in writing, they can type it, I have had a couple of experiences where young people have said "Well, how do you want it? Do you want me to write it?" And I was, "How about in cursive?" and whoa, that was a whole different project.

But to take it into math, and I think if we make these suggestions to the schools we're doing something wonderful. So one evening we ran into a family with the grandparents and all and I said to the young girl, "Well, ask your grandparents what they remember," and it was fascinating when the mother turned to her son and said "You were two weeks old, and I made sure you watched it on television."

Well, it brought all the generations together, and so that's one of my major things to see please, let's put it out there that everybody's talking about it. And so the grandparent were like "Oh, remember what we did," and how exciting it was, and "I was in the hospital, but someone else was watching it," and I just think that we're going to get this excitement level going, and that's what we want to do so that everyone, however you're taking it out to the public, is just going to be more fun and exciting.

Like one of your earlier speakers said, well, he's involved because of his father. I'm involved because I have a photograph I was given of the bell that came back to North American Rockwell. I mean I have actually a photo of it, and then I ended up designing for NASA. So I'm STEAM, and I would love to see more of the women being noted, whether it be from way back when or

today or tomorrow, and I enjoyed the presentation but I'd like to see some more cross-culture as well, especially today with the diversity, so that's my comment. Thank you.

Jeff Nee: Thanks, Rosanne I really appreciate that and I wanted to mention too, I think it was Nicole who mentioned that she wanted more stuff. I hope everyone's seen the Women of Color lithograph that you can hand out, that features Katherine Johnson on it and a whole bunch of other women of color throughout NASA.

If you don't know where that is, just ask and especially the number one thing that I like to point people to is last February, February 2017, is that right, Kay? I think it was February 2017, we had this great conversation about Women in STEM, and they had all these resources. So if you're on the telecon archive, remember we record and we archive all these as a little time capsule of everything that's going on in NASA pretty much, as much as we can.

Then as far as the spinoff goes, if you can look up the Apollo 40th anniversary, I know we're coming up on the 50th anniversary but if you look up the Apollo 40th anniversary, NASA has an entire website that still has relevant resources that you can use to celebrate Apollo, including a dedicated handout of all the Apollo spinoffs. So if you look up Apollo 40th anniversary that they released ten years ago, all that information still applies and is still usable.

Adrienne Provenzano: Hi Jeff, I ask questions so you recognize my voice, that's cool. So hi, this is Adrienne Provenzano, I'm Solar System Ambassador. I'm usually in Indianapolis and actually in, on the Space Coast in Florida for the Space Conference, the first ever education conference here that's taken place.



I'm doing a presentation about using space textiles, specifically quilting and collaborating with one of the retired sisters of NASA with that. So to speak to one of the SSA's comments about STEAM, I'm a STEAM educator, there was an exhibit at the Houston Quilt Show a few years ago, it was all Moon quilts, and some were specifically about Apollo 11.

So you can just look up Moon quilts Houston, you can find that, and that's all archived. So I just throw that out there, so the one gal that has the planetarium and is looking for ideas for connecting her community with the memory book, doing quilts, they can be collage, they can be no sew my workshop is no sew with glue, paper, so whatever. So I'm just throwing that out there as an idea.

I want to mention on February 8, 2018, there was a Solar System Ambassador teleconference, it was about Dr. George Carruthers, who's an African American scientist, and he has an experiment that is actually still on the Moon, earlier, if she's still on the line, somebody was asking about whether the we could not fail, whether people in that book are highlighted in any way. So, I mean, this program has a whole wonderful presentation and that is in the archive.

I did have a question, which I don't know if anybody's still on the line that can answer this, but it was really interesting to me to hear people, I guess it was Dr. Petro in his presentation talking about how Apollo 11 was more get there, come back safely, than science mission and return samples.

And since that's kind of what it morphed into, are there any specific science conferences that have been planned or science challenges, whether for established scientists or for any kind of young, emerging professionals? Do any of you know of anything that's going on in that aspect of it so that we can

kind of make sure we're highlighting and bringing a lot of quality science education into this as well as the history aspect of it.

Andre Jones: This is Andrea, I have been lurking, but I don't know of any specific science conferences planned, we can certainly let Jeff know if there are specific Apollo ones. There are many lunar science conferences throughout the year, and I am sure every one of them will be featuring celebrations about Apollo in some way. The SSERVI Forum just recently I know touched on it. We're going to have another lunar meeting this fall, there'll be the lunar and planetary science conference coming up, so it will definitely be out there.

I will mention that from the LRO team, we're planning to put together an entire slide deck that we'll make sure it's available to all Solar System Ambassadors and Museum Alliance folks, that goes through some science highlights that you can feature. It'll just be a slide deck and you can pull from it at will for whatever's most relevant, whatever you want to discuss.

But we'll make sure that we include a lot of that content in there. And if there are specific things from anyone on the call that you're looking for, we're about to be developing more products for this. So I'm listening in and writing down to see how we might be able to help with some of these interests.

Adrienne Provenzano: And then are you also working at all in kind of bringing back to a profiling what happened with GRAIL and the Mooncam, because when that mission took place it established some really amazing imagery that students worked with and that kind of disappeared as these things do, the next cool mission came along. So I was wondering if anybody was going to be highlighting Mooncam.

Andrea: I don't know of any plans to highlight Mooncam specifically. Normally the Mooncam I'm thinking of is the Moon cameras on LRO, but there is still, you know right now you can still request images through Juno's camera. But if there's any, I can talk to the GRAIL team and find out what their plans are for the anniversary and see if they might consider Mooncam content or ways to feature it.

David Seidel: Yeah, only concern I have is most of the GRAIL team isn't funded anymore. So they may not have function, and Mooncam was an EPO camera itself and I'm not sure where even the images themselves are archived. So it may be a steep uphill battle to integrate Mooncam into the anniversary.

Adrienne Provenzano: But you do work with the Lunar Planetary Institute, which also has its own huge resource database

Andrea: Yes, we do work with them.

Adrienne Provenzano : Okay, great, thank you very much.

Jeff Nee: Yeah, and that's what I was going to mention is Christine Shupla at LPI, the Lunar Planetary Institute, she does an annual conference as well for that kind of thing. She even, Adrienne did you go to the Solar System Ambassador get together for that one last.

Adrienne Provenzano: I did, and it was cool, for folks from JSC brought Moon rocks, and....

Jeff Nee: Is that the kind of format that you were thinking of when you asked your question? You ....

Adrienne Provenzano: Well, yeah, I mean that was geared towards Solar System Ambassadors and there were actually speakers on a lot of different things. They had a, I'm not remembering people's names at this point, but there was a woman who studies swirls on the Moon and talked about her research. There was a guy who does visualization, he's worked on I think New Horizons and some other missions, and they had a couple of other different scientists as well.

So yeah, I was kind of wondering about that, but I'm thinking in terms of connecting science professionals but as well as students, so you know Cubesats, some kind of Cubesat connection with the Moon or better understanding why these samples were so important, why they're being studied now. Why, as science evolves they're still being studied and new discoveries are being made. Just wondering if there is anything being offered in connection with that.

Christine: This is Christine, I'm actually on the line.

Jeff Nee: Oh, hi Christine, hi.

Christine: Didn't want to interrupt though. And Jeff has been great about posting a number of our lunar resources on the Museum Alliance site. And we're still trying to determine what all sorts of events we're going to be doing for this next year in connection with the anniversary, but we will absolutely be doing something. And we are open to people's suggestions and requests in terms of ways to continue to share out the various resources that everyone in the community has created, as well as the scientists, so.

Adrienne Provenzano: Yeah, one of the things I found so fascinating was the library tour and just being able to see all those logs of every word, every transcript of every mission, and amazing photographs. I know not all of that is digitized but a lot

of it is available online, so maybe just making sure that people are aware that the LPI exists and that those resources are out there.

Christine: Thanks, yeah, among the different resources that Jeff has put onto the museum Alliance site with their information is a link to a page that lists a variety of those digitized Apollo transcription resources.

Adrienne Provenzano: That's great.

Jeff Nee: Go ahead.

Christine: I just want to, Carol was asking, Carol, formerly Carol Helberg, good friend of mine, was asking about planetarium shows. Nineteen years ago, Carolyn Sumners produced, in connection with us when I was at the Dorn Planetarium and Apollo show. I'm sure that it's antiquated by now but there may be resources available from that people could then use to create something now. We're supposed to be co-creating it, and the only reason I remember the details is the week that we were supposed to produce the soundtrack for our version of it was the week that my son was born so I didn't actually do it.

Anyway, outside of that, yeah, there's so many different resources out there, it's just that many of them are low resolution high resolution by today's standards. And that's all I've got to say to everybody, but you can e-mail me, Jeff can get you my contact information. If there's anything from LPI that you are looking for or requesting.

Jeff Nee: And for Adrienne if you're looking for Moon camera stuff for students, I think the closest thing that I've heard of is the Cosmoquest Moonmappers citizen science project. If you haven't checked them out in a while, check them out,

CosmoQuest.org is what they are. And that's being run out of, oh gosh, is that the ASP with Pamela Gay. I can't remember.

But they have a whole website with citizen science projects, including Moon stuff for you to try out. In fact, I should add that to our resources. And the list of resources that people are talking about is on the Museum Alliance page. I don't know if Heather or Kay got it linked to on the telecom page yet, but if you just go to, if you're on the Museum Alliance page at all, if you just look for Apollo 50th in the search bar or anything, that should be the first thing that comes up.

I've been working on it every day pretty much for the last few weeks and just adding everything that I could possibly find. It's not a page that looks pretty, but it's just a list of stuff that you may or may not find useful, including you know old movies and images, the Women of Color lithograph is on there as well, and of course everything that Andrea and Christine have sent me is on there too.

Jan Hill: Hi, my name is Jan Hill, I'm a Solar System Ambassador, I spoke earlier. One thing that our community worked on in our earlier elementary school when my kids were there was Walk to School Day is in October. And so we walked through the solar system. I put up signs of the different planets and actually my husband and I spaced them according to the rock planets and whatever.

So I was thinking that could be adapted to Apollo, where you start out with the earlier Apollos and you go forward, you know, instead of it being a distance thing it could be a timeline. So I was just throwing that out as a possibility for some people who also are doing Walk to School Day, which this year it's going to be October 10.

Jeff Nee: October 10 is Walk to School Day? Okay, fine, all right, I'll put that on the calendar. Yeah, I think a scale model of anything is always a good way to talk about space, if you give people the Earth globe that they have at home and say how far would it take you to go to the Moon if the earth were this big, I think that's always a good way to go in terms of space education. Because it's just so hard to visualize otherwise.

JaN Hill: Yeah, it's really fun, the kids really get to appreciate the inner planets versus the outer planets, because they walk it seems a long time between Neptune and Jupiter or Jupiter and Saturn. Saturn and Jupiter. And so then they get up close to, well hey this is already Mars and there's Earth and there's Venus and Mercury right there. They can see them all. So it's a really big event in our community, it's kind of fun. But I'd like to change it up to Apollo and not just have it space, we call it a spacewalk, but instead of doing that I would like to maybe make it an Apollo.

Jeff Nee: Yeah, I mean I was asking Noah for those KML files, and if you don't know what KML files are they're the things that Google Maps and Google Earth and all those mapping things use to kind of place objects on a map. So for example, when you have the KML file from Noah, you'll be able to put that Apollo track to show where they all moved, anywhere in your town. So you can put it in your school, at your library, at your science museum and just like you said let people walk the Apollo missions, basically.

So hopefully Noah will get that to us as soon as he can and post on the Museum Alliance for you.

Lisa Harmon: Thank you. This is Lisa Harmon, I'm a Solar System Ambassador from the coast of North Carolina. This is going back to international Observe the Moon night and the buildup to the anniversary. Something that I like to do that if

you're doing an event and would like to draw in additional portions of the population that might not normally turn out to an event, is think of something specific or unique to your area.

I draw on the international surfing community living along the coast, and people really relate when you're talking about something personal and firsthand. And I relate how my brother was a world champion surfer, and he was against people of the same level of physical skill and athleticism but the extra little twist he had in his pocket was he was an astronomer, and he would go the night before every event and stay out and watch and observe the Moon, and the effect it has on the waters and the tides, and then the effect it has on the sand underneath the waters.

So the next morning, as everybody else was crawling out of bed and walking down to the beach, just getting ready to surf, my brother already knew where the surf was going to be breaking, if it was going to be breaking left or right, if it was going to be outside the regular breaks which were going to get the better, cleaner waves.

And so you know just sharing information like that, that brings in a whole other community that normally may not be that interested, they're used to just looking up and seeing the Moon in the sky and so why should they go to an event just for that. So if you find something unique about your area, or something that you can personally relate to, you might be able to draw in additional sectors of the public. Thank you.

Jeff Nee: Yeah Lisa that's a great point and that's exactly why the ambassadors and the Museum Alliance were created, because NASA can only reach so many people and we can't, I mean the problem with NASA is we can't reach the people that we can't reach if that makes any sense.



You know that's why the ambassadors, you should go find that niche, that really makes you incredibly valuable to NASA and to education and to you know just the future of humankind, let's not be too melodramatic. But still, yeah, no, I mean it's true, this is why we're doing what we're doing, this isn't just my job, it's my passion, right, to help educators like you reach for the people that I would never even have thought to reach, right, like surfers.

Exactly right. So find your like you said, your local, I'm just curious, other than your brother, Lisa, do you have any advice for people who are trying to look for their local niche, their local audience, that they can really have an impact on. Do you have any advice on that?

Lisa Harmon: Well, it's based on find something unique about your geographic location. Like I say, living along the coast, of course, that's going to be something I will always focus on. The Moon and the navigation. For centuries, we counted on the stars in the sky to get us where we're going. Where I live at is an area called the Graveyard of the Atlantic because the seas are so treacherous and where I live that was the only port for centuries.

So that's another program that I do that brings in people that normally probably would not come to a NASA JPL program or presentation. And so what I'm doing is I'm looking at the things that are unique about the geographic location where I live and how space, space exploration, the skies, the stars, the moons, all of that, find something that's unique and make that your cornerstone to draw in people who had never been interested in astronomy or space before you can get them to the door. Once you get them to the door, you've pretty much got them.

Jeff Nee: Great, thanks. And anything else?

Adrienne Provenzano: Yeah, I just had a quick question. I'm just thinking about moons generally and as much as we have this amazing hype about our one Moon there's so many other moons out there. So I'm just wondering what your thoughts are or others on the call about somehow connecting, we're talking about the length between Earth's Moon and our Mars mission, so Phobos and Deimos, do we want to make connections there, are there ideas for connecting to Enceladus, I guess the Europa clipper mission's going to happen eventually. What are your ideas about that?

Jeff Nee: Yeah, I mean the thing that Andrea mentioned before was, really resonated with me, that the Moon is truly the gateway to the whole rest of the universe, right? And just thinking about what the Apollo mission has represented of, this is when humans really literally stepped foot out into space and really started this whole exploration 50 years ago.

And if you're asking for specific ideas on activities that you could do, the ideas that I have just from my own museum background have to do with things like orbits and just what is a moon, why is it called a moon, and like you said you can link it to all other moons.

If you're doing International Observe the Moon night, I'm pretty sure Jupiter will still be visible, I'm pretty sure. Right? Somebody can correct me if I'm wrong. But you can see Jupiter's moons really easily in a telescope, right?

Adrienne Provenzano: It's amazing, I had a chance to do that, and I was like "Wow, they're really there."

Jeff Nee: Yep, and you know they look like stars but they're really the moons, and any given star map website. I wonder if the NASA website will do this for you.

Maybe, if you go to the NASA Jupiter website, I wonder if it will show you. But any generic star map website will show you the positions, the exact positions so you can actually point out, this is Europa right over here, and this one, the one on the far left is Callisto, for example.

So if you have a telescope and if you don't, I really hope that you look into getting one, even a cheap \$20 one from some generic store is great to look at the Moon with. Any telescope is fine. I think this is a great point that you made, that the Moon truly is a gateway to the rest of the universe and that's why it's so powerful.

Adrienne Provenzano: Well, there's that amazing picture that the InSight mission, the MarCO cubesat, kind of almost like homage to the Voyager picture of the Earth, one of the cubesats took that, and it's an iconic picture now I think of, there's the Earth, this little blue dot, and then there's a little gray dot, that's the Moon. And again, it's just puts it in context of like where we are, I think.

Jeff Nee: Yeah, I absolutely agree, couldn't have put it better myself. Yeah, okay, I mean this is as good a time to wrap up as any. Thank you to everybody for joining us, I know it was super-long but I hope it was super-useful too. And we're happy to help in any way we can.

END